

## **EE 511- Discrete Control Systems**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr Hassan Ibrahim

### **TEXT BOOK:**

Charles L. Phillips & H. Troy Nagle, "Digital Control System Analysis and Design", Pearson Education International

### **COURSE DESCRIPTION:**

Z-transform and its properties. Pulse transfer function. Linear difference equation. Signal analysis and dynamic response. Analysis of sampled data systems. Block diagram and closed loop transfer function of discrete data systems. Stability analysis of discrete data systems. Root locus in the z-plane. Frequency response method. Design of discrete data systems using compensating networks. State-space description and solution.

### **PREREQUISITE:**

EE 412

### **RELATION OF COURSE TO PROGRAM:**

Elective

### **COURSE INSTRUCTION OUTCOMES:**

The student will be able to analyze and design discrete- data systems using classical control approach.

### **TOPICS COVERED:**

- Introduction to digital control
- Z-transform
- Discrete data system representation and properties.
- Stability, error analysis.
- Root locus technique for discrete systems
- Frequency response of discrete systems
- Design of digital control loops
- PID tuning

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional Component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Engineering Design</b>
	√	√	√

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course Outcomes</b>
a.	An ability to apply knowledge of mathematics, science, and engineering.	
b.	An ability to design and conduct experiments, analyze and interpret data.	
c.	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	√
d.	An ability to function on multi-disciplinary teams.	
e.	An ability to identify, formulate, and solve engineering problems.	√
f.	An understanding of professional and ethical responsibility.	
g.	An ability to communicate effectively.	
h.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	
i.	A recognition of the need for, and an ability to engage in life-long learning.	
j.	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k.	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	√